PATENT SPECIFICATION

1,075,939

1,075,939

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Int. Cl.:—**B 05 c** // A61l.

COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements in and relating to Adhesive Surgical and other Tapes, Plasters, Bandages, Dressings and the like

We, T. J. SMITH & NEPHEW LIMITED, a British Company, of Neptune Street, Hull, Yorkshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to adhesive surgical and other tapes, plasters, bandages and dressings of the kind in which the adhesive is carried by one surface of a microporous synthetic thermoplastic film of desired gauge.

A main difficulty in the past, in producing such microporous film, particularly but not exclusively in the case of an adhesive surgical dressing, has been to give adequate and even spread of adhesive on one surface of the film, whilst leaving a sufficient area free of adhesive for the passage of water-vapour.

According to the present invention, the mixture for the microporous film which includes a removable filler is cast in the normal manner to form the film, then, the film is embossed on one surface in any suitable manner so that part of its area is at a high level and part at a lower level, the high and low level portions being arranged in an approximately uniform manner over the area of said surface, and then the filler is removed. In many practical forms the embossment preferably comprises a uniform raised pattern of similar spaced-apart embossments, or a crossing, diamond-like or other arrangement of "lines". The embossments may be relatively deep in relation to the remaining thickness of the film at the base of the embossments.

It is known that microporous film can be made by including in the mixture from which the film is cast a removable filler and then removing this from the cast film. In the present invention, however, the consequence of the embossing is that the upper surface of the film will have high areas at the top of the embossments and lower areas at the base of the embossments, the under surface of the film being flat to give a smooth surface, for example, to the other side of the dressing.

The next step in the process according to the invention is to spread a coating of adhesive, preferably a pressure-sensitive rubber adhesive, on the high areas at the top of the embossments, for example, by a suitable transfer spreading unit, leaving the lower areas at the bases of the embossments uncoated.

In the result their is obtained a microporous film, particularly but not exclusively for surgical dressing (of any kind requiring such a film) which is adequately and also uniformly coated with adhesive on one surface over certain areas (which may be interconnected) whilst other areas, which are more or less uniformly arranged and possibly interconnected, are free from adhesive and permit the passage of water-vapour through the film.

If desired, before the pressure-sensitive or other adhesive is spread, the areas which receive such adhesive may have a key-coat spread thereon.

In particular ways of carrying the invention into effect, in some cases the film, which is cast on a paper backing in a known manner, can be embossed hot on the paper backing after casting, either before it has cooled or by re-heating it after cooling.

As will be appreciated, the shape and arrangement of the embossments may be such that although uniformly spread out in a plurality of separate positions, the high areas have a total area which may be equal to, or more than, or less than the total

sum of the areas which are not coated with adhesive; in most cases, for surgical plasters, bandages or dressings, it is preferable that the total sum of the uncoated areas should be the greater.

The removable filler may be any of the known substances which have been used for making microporous film, such as water-soluble inorganic salts or starch. By way of example, an embossed microporous film of polyvinyl chloride can be made as follows. Polyvinyl chloride (50 lbs.), polypropylene sebacate (plasticizer) (50 lbs.) and finely divided maize starch (150 lbs.) are first mixed in a suitable jacketted internal mixer and then wetted out with methyl cyclohexanone (70 lbs.). Mixing is then continued at 95/100°C for two hours or so. The plastic mass formed is then extruded at raised temperature through a suitable die to form a flat film, from which the solvent is removed by passing through an oven at 110°C. Whilst the film is still in the plastic state it is embossed and then treated with water at about 100°C until the starch grains have swollen. The film is then treated, firstly with 5% caustic soda solution, followed by 5% sulphuric acid until free of starch. Finally the film is subjected to a solution of a wetting agent in a suitable bath to remove the last traces of acid.

In order that the invention may be beter understood, it will now be described with reference to the accompanying drawings which are somewhat diagrammatic and given by way of example only, and in which:—

Fig. 1 is a side elevation and Fig. 2 is a plan, of a portion of a film of thermoplastic material, the mixture from which it is formed including a removable filler before it is embossed and from which a tape, plaster, bandage or dressing in accordance with the invention is to be made.

Fig. 3 shows a side elevation, and Fig. 4 a plan to an enlarged scale, of an example of a portion of the film shown in Figs. 1 and 2 after embossment.

Figs. 5 and 6 show similar views to Figs. 3 and 4, of another example of a portion of the film shown in Figs. 1 and 2, after embossment.

Fig. 7 is an isometric view (to a larger scale) of a portion of the embossed film shown in Fig. 4.

Fig. 8 is an isometric view of a portion of the film shown in Fig. 6, to a smaller scale.

Fig. 9 shows a part of the film as illustrated in Fig. 7 but to a larger scale and with the high-level areas of the embossments carrying an adhesive coating.

Fig. 10 is a similar view to Fig. 9, but of a portion of the film shown in Fig. 8.

Fig. 11 is a plan and Fig. 12 a side elevation of a surgical dressing in accordance with the invention, having an adhesive-coated microporous film backing as shown in Fig. 9.

Fig. 13 is a plan and Fig. 14 an end view of a portion of a long band of surgical dressing, to be cut into lengths as required, in which the backing is a microporous film as shown in Fig. 9.

Fig. 15 is a plan of a length of microporous film bandage formed from a coated film as shown in Fig. 9.

Fig. 16 is a plan of a length of industrial or surgical tape formed from a coated microporous film as shown in Fig. 10

For the sake of clearness, the thicknesses of films and adhesive coatings shown in the drawings are exaggerated.

In Figs. 1 and 2 the film 17 is made from a mixture for forming a microporous film, after such mixture has been cast and before the removable filler has been removed.

This film 17, for the purpose of the present invention, can be embossed by any suitable means and in any suitable manner before the removable filler is removed.

In Figs. 3 and 4 there is a criss-cross "diamond" pattern of "lines", the upper surfaces of which form high-level areas 18 of the upper surface of the film, whilst the bases 19 of the depressions between said lines form the lower-level areas of the upper surface of the film.

Attention is drawn to the greatly enlarged view of a fragment of the unleached film shown in Fig. 7, which clearly demonstrates the high-level areas 18 (which are in this case a continuous-coated area) and the low-level areas 19, which in this case are not connected.

In Figs. 5 and 6 there is a criss-cross diamond pattern of wide grooves, the surface areas 20 of which are the low-level areas (in this case forming a single continuous connected area) and these leave projections 21 at their crossing points, the upper surfaces of which projections are the high-level areas 22, which are separate and discontinuous in this instance.

After the cast film 17 has been embossed, for example as illustrated in Figs. 3, 4, and 7, or Figs. 5, 6 and 8, the removable filler is removed and as a result the film becomes microporous.

A coating of adhesive, preferably a pressure-sensitive rubber-based adhesive, is then spread, in any suitable manner, on the high areas at the top of the embossments.

Fig. 9 shows a portion of the material of Fig. 7 after it has been leached and with such an adhesive coating 23 on its upper high-level area.

Fig. 10, which represents a portion of

the material as shown in Fig. 8, shows the projections 21 with their upper surfaces, that is, the high-level surfaces, each with an adhesive coating 24 which, taken together, form the adhesive coating of the microporous film.

Adhesive tapes, bandages and plasters made in accordance with the invention can be used for a great variety of purposes, especially where it is desirable that the film backing thereof should be pervious to air.

However, they are particularly advantageous for surgical and medical purposes, and Figs. 11 and 12 show an example of the use of an adhesive-coated film according to a method of the invention, as used for a surgical dressing.

In these figures, the thick lines 25 on one surface of the film 26 represent a diamond pattern of raised "lines" with an adhesive coating on the upper surface area thereof such, for example, as shown in Fig. 9, to leave uncoated areas 27 which are at a lower level, whilst 28 is an absorbent pad of suitable material located centrally on and adherent to the adhesive coating, to leave a border portion all around the said pad, which border portion is readily adhered to the skin.

It should be emphasised that while the adhesive coating on the high-level areas is sufficient to secure and hold the dressing pad 28 in position, the uncoated areas of the border portion surrounding this pad allow the skin to "breathe". In Fig. 12 the usual removable two-part overlapping protective covering 29-30 is shown dotted in position, ready for removal when the dressing is to be used.

Figs. 13 and 14 show a similar surgical dressing to that shown in Figs. 11 and 12, except that the microporous film 31 is a continuous band and the absorbent pad 32 is also continuous and adhered to the criss-cross adhesive coating "lines" 33 in the central longitudinal axis of the band, to leave parallel lateral borders.

Any desired lengths of this band can be cut off to form the particular surgical dressings required.

Fig. 15 shows a portion of a surgical bandage, which can be in a continuous roll or of any desired length and width. It comprises the film 34 with the adhesive criss-cross lines 35 and uncoated areas 36 at a lower level. It can be used as a bandage, for strapping purposes or for holding large dressings in position, or otherwise. When of the required dimensions, surgical plasters can be cut therefrom, or such plasters can be made up purposefully by the method of the invention.

In all suitable surgical and medical tapes, bandages, plasters and dressings and the like where it would be necessary or advantageous, the adhesive coating may be medicated.

Amongst other advantages of adhesive-coated microporous films for surgical tapes, bandages, dressings and the like, when made according to the present invention, over those hitherto made, are that thicker and stronger films can be used without seriously affecting the flexibility, and that the uncoated areas of the film, at the base of the depressions (in relation to the embossments) need only be relatively thin, thus increasing the porosity of the uncoated portions.

The tape such as shown in Fig. 16 could be used for industrial and surgical purposes. It is made in accordance with the invention, with the adhesive-coated high-level areas arranged generally in the manner shown in Fig. 10.

It consists of a strip 37 of the microporous film having high-level disconnected adhesive-coated areas 38 and low-level continuous uncoated areas 39. Such tapes could have the high-level coated areas, such for example as shown in Figs. 11 to 15.

Similarly, the dressings and the like such for example as shown in Figs. 11 to 15 could have high-level coated areas such as shown in Fig. 16.

The invention is not limited to the precise forms or details herein set forth, as these may be varied to suit particular requirements.

WHAT WE CLAIM IS:—

1. A method for making a microporous synthetic thermoplastic film having an adhesive coating on one surface thereof, comprising preparing the mixture for casting such a film and including in such mixture a removable filler, casting the film, then embossing one surface thereof so that part of its area is at a higher level and part at a lower level, the higher and lower level portions being arranged in an approximately uniform manner ove rthe area of said surface, then removing the filler to render the film microporous, and finally coating the said high-level portions of the area of said one surface of the film with an adhesive, and leaving the said lower level portions of the area uncoated by the adhesive.

2. A method for making a microporous film having an adhesive coating on one surface thereof, as claimed in claim 1, in which the areas of high-level to be coated with adhesive are interconnected.

3. A method for making a microporous film having an adhesive coating on one surface thereof, as claimed in claim 1, in which the low-level areas which are not coated, are interconnected.

4. A method for making a microporous film having an adhesive coating on one surface thereof, as claimed in claim 1, in

which the film is prepared as a continuous sheet of desired width, and is subsequently embossed, then the filler removed and then coated with the adhesive.

5. A method for making a surgical dressing, comprising preparing a microporous film having an adhesive coating on one surface thereof as claimed in claim 1, dividing-off a portion of desired shape of such a coated film to form a backing for a surgical dressing, and securing to the adhesive surface of the said divided-off portion an absorbent pad of such shape and size and so located that border portions of the coated surface are left beyond the confines of the absorbent pad, for securing the dressing to the skin of the user.

6. Microporous synthetic thermoplastic films having an adhesive coating on one surface, whenever prepared by any of the methods claimed in any of the claims 1 to 4.

7. Adhesive surgical and other tapes, plasters, bandages and dressings whenever prepared by any of the methods claimed in any one of the preceding claims 1 to 5.

8. Microporous synthetic thermoplastic films produced by the methods claimed in any one of claims 1 to 5 and shown in Fig. 1, 2, 3, 4, 7 and 9, or Figs. 1, 2, 5, 6, 8 and 10, of the accompanying drawings.

9. Surgical tapes, plasters, bandages, dressings produced by the method claimed in any one of claims 1 to 5 and shown in Figs. 11 and 12, Figs. 13 and 14, Fig. 15, or Fig. 16, of the accompanying drawings.

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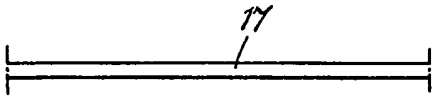


Fig. 1.

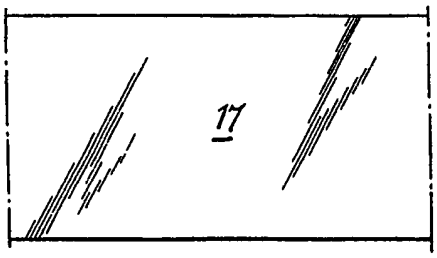
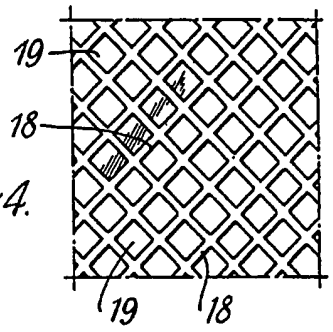


Fig. 2.

Fig. 3.



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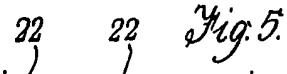

Fig. 5.

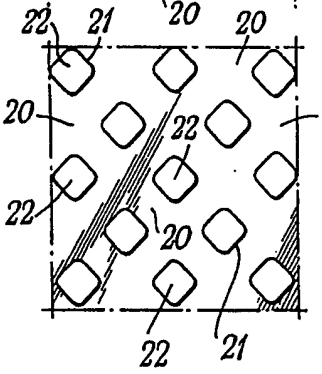

Fig 6

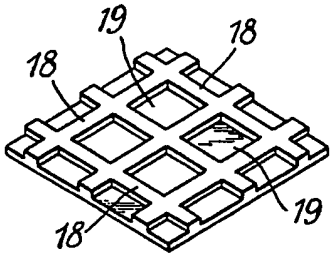

Fig. 7.

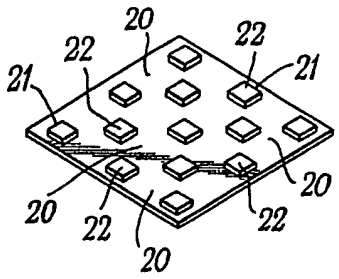

Fig. 8.

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SHEETS 1 & 2

Fig. 9.

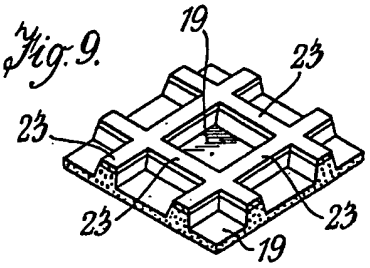


Fig. 10.

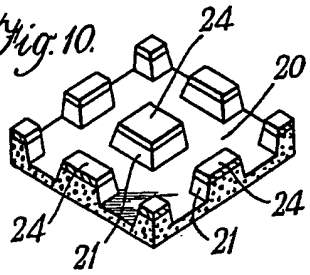
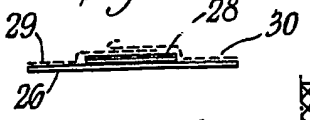


Fig. 12.



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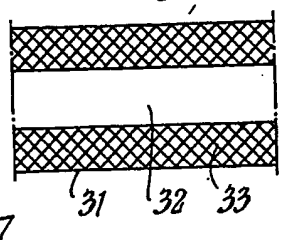

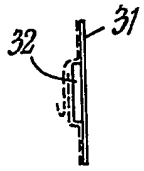

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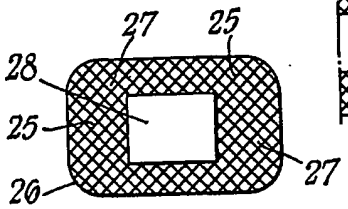

Fig. 11.

Fig 6

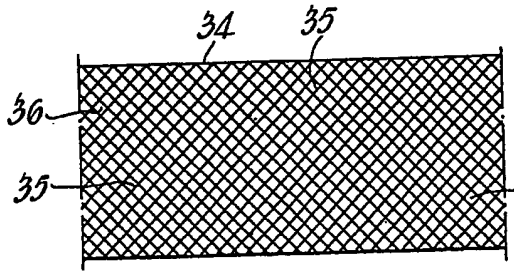

Fig. 15.

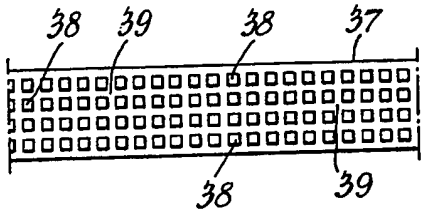

Fig. 16.

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SHEETS 1 & 2

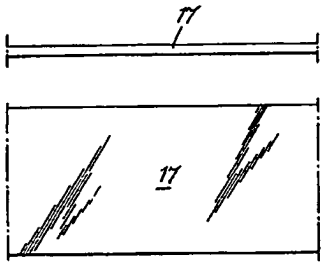


Fig. 1.

Fig. 2.

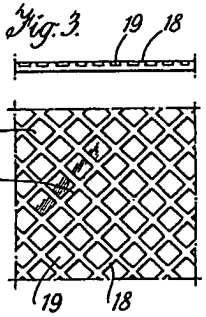


Fig. 3.

Fig. 4.

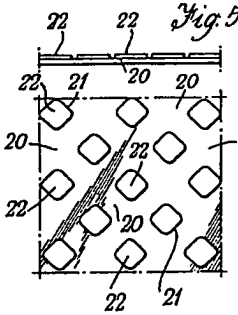
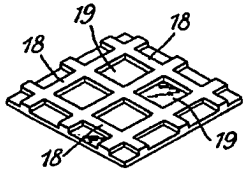


Fig. 5.

Fig. 6



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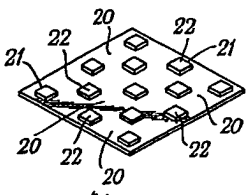

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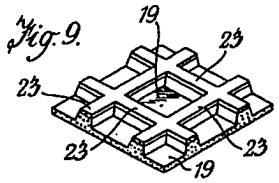

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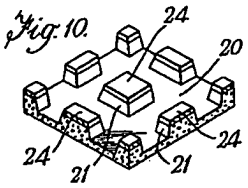

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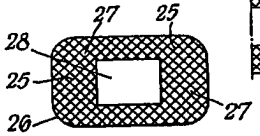

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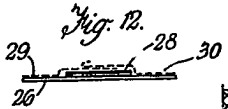

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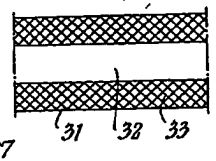

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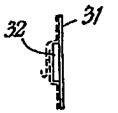

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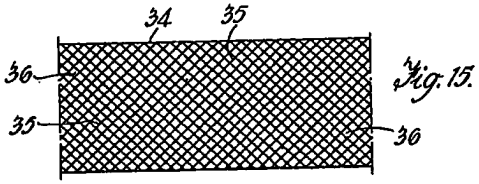

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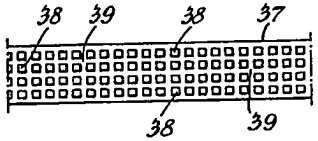

Fig. 16.